

Blackhill Quarry, Leeds

Storm Water Storage Analysis

December 2022

Project Information	
Project:	Blackhill Quarry, Leeds
Report Title:	Storm Water Storage Analysis
Client:	Mone Brothers Excavations Ltd
Instruction:	The instruction to undertake this Storm Water Storage Analysis was received from Mark Smedley of The Mineral Planning Group Ltd acting on behalf of the Client.
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Approval Record	
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This report will remain valid for a period of twelve months (from the date of last issue) after which the source data should be reviewed in order to reassess the findings and conclusions on the basis of latest available information.

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Introduction

Waterco has been commissioned to undertake Storm Water Storage Analysis in relation to a proposed development at Blackhill Quarry, Leeds.

The purpose of this report is to estimate the volume of surface water storage discharging from two separate proposed hardstanding areas as to inform the sizing of a water storage lagoon. Storm water storage estimates will be considered for lagoon emptying frequencies of once every 2 weeks and once per month.

Site Overview

Blackhill Quarry is located at National Grid Reference (NGR): 427137, 442199. Online mapping (including Google Maps / Google Streetview imagery, accessed December 2022) shows that the site comprises of the existing Blackhill Quarry. The site is bordered by Kings Road to the north, agricultural land to the east, woodland to the south and agricultural land to the west. Access to the site is provided from Kings Road to the north.

The two hardstanding areas under consideration are assigned as Area A and Area B for the purposes of this report. Area A is for a concrete surfaced wash plant / aggregate recycling area with filter press and filter cake storage and will cover approximately 3,894m². Area B is for a stockpiling area and will cover approximately 4,355m². A proposed development plan is included in Appendix A.

Methodology

The volume of storm water storage discharging from both areas of hardstanding has been based on the following design criteria set out by the Client:

- 1) Scenario A – The storage lagoon is emptied every 2 weeks. The lagoon will be sized to accommodate the average rainfall for a 2 week period in wetter winter months in addition to a 1 in 30 year storm event.
- 2) Scenario B – The storage lagoon is emptied every month (30 days). The lagoon will be sized to accommodate the average rainfall for a 30 day period in wetter winter months in addition to a 1 in 30 year storm event.

To estimate the storage volume during the 1 in 30 year storm event, peak rainfall intensities for a 6 hour rainfall event have been obtained from the Flood Estimation Handbook (FEH) web service. The average rainfall intensity for a 6 hour duration 1 in 30 year storm event is 51.6mm. When accounting for 25% climate change allowance, a rainfall intensity of 64.5mm is estimated.

Average rainfall data has been obtained from the Met Office Hadley Centre UK Precipitation (HadUKP). Evapotranspiration rates have been derived from The UK Centre for Ecology & Hydrology (CHES). On

average, and based on the data obtained from HadUKP, November is the month with the highest average rainfall. The average rainfall total for November over the years 1961 through to 1990 is 54.8mm. For a two-week period in November, the average rainfall is 25.6mm.

The above rainfall data includes an allowance for losses through evapotranspiration. An allowance of 0.64mm per day is applied to represent losses through evapotranspiration.

Results

1 in 30 year Storm Event

Area A

Based on a total hardstanding area of 3,894m² and a rainfall intensity of 51.6mm, an estimated storm water volume of 200.9m³ is estimated for the 1 in 30 year storm event.

Based on a total hardstanding area of 3,894m² and a rainfall intensity of 64.5mm, an estimated storm water volume of 251.2m³ is estimated for the 1 in 30 year plus 25% CC storm event.

Area B

Based on a total hardstanding area of 4,355m² and a rainfall intensity of 51.6mm, an estimated storage volume of 224.7m³ is estimated for the 1 in 30 year event.

Based on a total hardstanding area of 4,355m² and a rainfall intensity of 64.5mm, an estimated storage volume of 280.9m³ is estimated for the 1 in 30 year plus 25% CC storm event.

In total, 425.6m³ of storm water storage is required to accommodate a 1 in 30 year storm event from contributing drainage areas A and B. 532.1m³ of storm water storage is required to accommodate a 1 in 30 year plus 25% CC storm event from contributing drainage areas A and B.

Monthly Average Rainfall

Area A

Based on a total hardstanding area of 3,894m² and a rainfall total of 54.8mm (over a 30 day period), an estimated storage volume of 213.4m³ will be required.

Area B

Based on a total hardstanding area of 4,355m² and a rainfall total of 54.8mm (over a 30 day period), an estimated storage volume of 238.7m³ will be required.

In total, 452.1m³ is required to accommodate surface water runoff from both contributing drainage areas over an average winter month / 30 days (assuming the lagoon is emptied once per month).

With a 1 in 30 storm event occurring in addition to the average rainfall within a typical winter month, a total estimated storage volume of 877.7m³ will be required assuming a lagoon emptying frequency of once per month. This increases to 984.2m³ when applying 25% CC on the 1 in 30 year event.

2-Week Average Rainfall

Area A

Based on a total hardstanding area of 3,894m² and a rainfall total of 25.6mm for a two week (14 day) period, an estimated storage volume of 99.7m³ will be required.

Area B

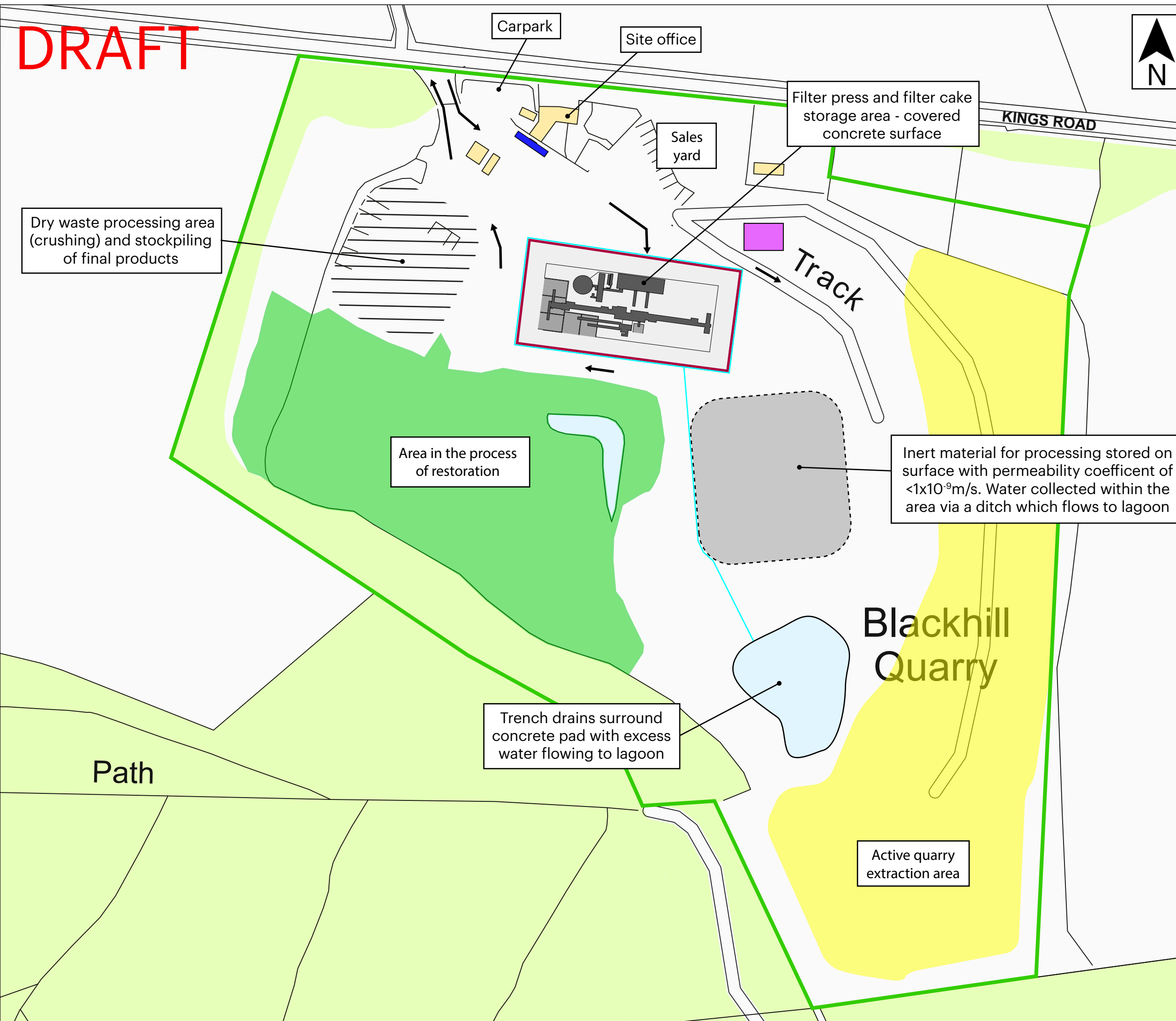
Based on a total hardstanding area of 4,355m² and a rainfall total of 25.6mm for a two week (14 day) storage period, an estimated storage volume of 111.5m³ will be required.

In total, 211.2m³ is required to accommodate surface water runoff from both contributing drainage areas over an average 14 day winter period.

With a 1 in 30 storm event occurring in addition to the average rainfall within a typical 14 day winter period, a total estimated storage volume of 636.8m³ will be required assuming a lagoon emptying frequency of once every 2 weeks. This increases to 743.3m³ when applying 25% CC on the 1 in 30 year event.

Appendix A Proposed Development Plan

DRAFT



Drawing Title: Site Master Plan

- Key:
- Permit boundary
 - Extent of concrete pad
 - Direction of traffic on site
 - Incoming waste materials stockpiling area for wash plant only
 - Wash plant final product bays
 - Wheelwash and weighbridge
 - Trench drains
 - Quarantine area

Dry waste processing area (crushing) and stockpiling of final products

Area in the process of restoration

Inert material for processing stored on surface with permeability coefficient of $<1 \times 10^{-9} \text{m/s}$. Water collected within the area via a ditch which flows to lagoon

Trench drains surround concrete pad with excess water flowing to lagoon

Blackhill Quarry

Active quarry extraction area

Path

Notes:
OS basemap reproduced under licence 100002120

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Scale:
1:1500 @ A3

Client:
Mone Brothers Ltd.

Site:
Blackhill Quarry

Drawing Number: 383/1 - Master Plan-1	Rev: 4.0
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Date:
01/11/2022